

REMARKS

The Office Action dated May 20, 2004 has been carefully considered. Claims 1, 4 and 6 are currently amended. Claims 1-7 are currently pending. Although the Office Action indicates Claims 1-6 are pending, Claim 7 was added by way of preliminary amendment.

35 USC §112, ¶2 Rejections

Claim 1-3 and 6 stand rejected under 35 USC § 112 second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. The Office Action indicates that said acrylic acid-containing absorbed in said acrylic acid absorption column in step c of Claim 1 is “obtained,” not absorbed. Claim 1 has been amended to replace absorbed with obtained thereby obviating the rejection of claims 1-3.

The Office Action indicates that Claim 6 does not recite any positive steps. Claim 6 has been amended to recite the positive step of polymerizing the acrylic acid. Therefore the Applicant respectfully requests withdrawal of this rejection.

35 USC §103 Rejections

Claims 1-6 stand rejected as obvious under 35 USC §103(a) as being unpatentable over U.S. Patent No. 4,873,368 to Kadowski (“Kadowski”). The present invention as currently claimed differs from Kadowski in several important aspects. The rejected claims recite a method for the production of acrylic acid by propylene oxidation using a first reactor and a second reactor. The method further includes the step of introducing the acrylic acid-containing gas into an acrylic acid absorption column and causing it to contact an absorbent thereby obtaining an acrylic acid-containing solution, wherein (i) mixed gas introduced into the first reactor has a propylene concentration in the range of 7 – 15 vol. % and (ii) a water concentration is in the range of 1 – 10 vol. %, and (iii) said acrylic acid-containing solution has a water concentration in the range of 1 – 45 wt %.

As opposed to the invention as claimed, Kadowski neither discloses nor suggests the absorption step,(b), as claimed in the present invention, resulting in solution with a water

concentration in the range of 1 - 45 wt.%. The effect of such step is to restrain fluctuation of loss of acrylic acid in the absorption column and to keep waste water generated from the process to a minimum, and to secure the stability of operation at the subsequent steps including the equipment for the treatment of the waste water. In fact, Kadowski does not teach introducing an acrylic acid-containing solution into an absorption column at all.

Additionally, the invention as presently claimed limits in (a) the water concentration to between 0 – 10 vol. %. In contrast, Kadowski teaches a ratio of steam/propylene that is limited to less than 4, resulting in a range of permissible steam from 0 to 28 % at the low end of propylene concentration to 0 to 60% at the high end of propylene concentration, which is a very broad condition. However, Kadowski does not teach the importance of keeping the water concentration between 0 and 10 vol. % at the first-stage reaction. As disclosed in the present invention, the amount of water introduced to the first reaction zone affects the water concentration of the acrylic acid-containing solution and is therefore limited to 0-10%, which in turn limits the water concentration of the bottom liquid of absorption column.

Again, by limiting the water content in the bottom liquid of the absorption column, the polymerization at the subsequent steps of the process can be effectively prevented. The invention as presently claimed recites the steps for accomplishing this benefit, which is not disclosed or suggested by Kadowski.

Double Patenting

Claims 1-6 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over co-pending application No. 10/633,170. The Applicants respectfully assert that the claims between the present invention and the co-pending application are sufficiently distinct. The claims presently amended highlight the difference from the co-pending application. In particular, the claims as amended now recite separate first and second reactors for each stage reaction. In contrast, the co-pending application that the first reaction zone and second reaction zone are formed in a single reactor.

In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited to contact the undersigned should he believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,

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